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## SHORT COMMUNICATION

# The development and validation of a short form of the STERLinG: A practical, valid and reliable tool to evaluate teacher competencies to encourage reflective learning

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## Abstract

**Background:** To optimize response rates, it is important to have brief, comprehensive instruments.

**Aims:** We have developed and validated a short form of an instrument for measuring students' perceptions of teachers' competencies to encourage students' reflective learning in small groups (the STERLinG).

**Methods:** Based on statistical and content criteria, the original 36-item STERLinG was reduced to 15 items: three scales with five items each. This mini-STERLinG was validated. Confirmatory factor analysis was performed and internal consistencies were calculated.

**Results:** The instrument was completed by 501 respondents (63%). The original instrument structure was confirmed with 62.6% explained variance. Reliabilities were high with 0.91 for the entire mini-STERLinG and 0.87, 0.85 and 0.81 for its subscales.

**Conclusions:** The mini-STERLinG was found to be a feasible, valid and reliable instrument.

## Introduction

Reflection on experiences and one's own behaviour has been acknowledged as essential for professional behaviour (Schön 1987; Stark et al. 2006; Stern 2006; Mann et al. 2009). Therefore, the development of reflection skills has received increased attention in medical education. The small group setting seems to be an effective educational environment for training students' reflection skills (Schön 1987; Henderson et al. 2002; Mann et al. 2009; Schaub-de Jong et al. 2009). Since the teacher plays an important role in facilitating small group processes (Boud & Walker 1998; Schaub-de Jong et al. 2011), it is important to provide teachers with valuable feedback on their competencies in training reflective skills.

In a previous study, we developed and validated a student rating scale – the STERLinG – to evaluate teaching competencies to stimulate students' reflection in small groups (Schaub-de Jong et al. 2011). Three domains emerged as vital for facilitating students' reflection processes: *supporting self-insight*, *creating a safe environment* and *encouraging self-regulation*. These three domains correspond closely with educational theories.

Since teaching reflection is a relatively fallow terrain in health sciences education, more research is necessary to find out whether and how teaching reflection is related to (improvement in) students' reflective skills. However, having

students complete too many instruments can lead to low response rates and response bias (O'Rourke 1999; Porter et al. 2004; Kreiter & Lakshman 2005; Van Geest et al. 2007). To optimize response rates, it is important to have brief, though comprehensive instruments (Roszkowski & Bean 1990; Smits & Vorst 2007). We wondered whether the STERLinG, which was developed carefully, could be shortened to a one-page instrument while preserving its psychometric qualities and original instrument structure. The objectives of this study were to develop and validate a short version of the STERLinG – the mini-STERLinG. The validation process included investigating whether the trichotomy *supporting self-insight*, *creating a safe environment* and *encouraging self-regulation* was retained in the mini-STERLinG and whether the reliabilities of the mini-STERLinG and its subscales were acceptable.

## Methods

### Development of the mini-STERLinG

The original STERLinG (Student's perceptions of their Teachers' competencies to Encourage Reflective Learning in small Groups) contains 36 items on a 5-point Likert scale (1 – strongly disagree, 5 – strongly agree) encompassing three domains: *supporting self-insight* (18 items), *creating a safe environment* (7 items) and *encouraging self-regulation*

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(11 items). We reduced the original 36-item STERLinG to a one-page 15-item questionnaire by selecting five items from each domain based on statistical as well as content criteria: (1) based on the outcomes of the dataset used to identify the instrument structure of the STERLinG (see Schaub-de Jong et al. 2011, *Study 1*), we only included items with factor loadings  $>0.50$ ; (2) the first two authors carefully selected items to ensure coverage of each domain's essence.

### Respondents and procedure

We invited three groups of undergraduate students to participate voluntarily and anonymously in our study: 413 second-year medical students and 152 first to third-year dental students from the University of Groningen, and 226 first to fourth-year speech & language therapy students from the Hanze University of Applied Sciences Groningen. They completed the mini-STERLinG during the last session of their professional development courses by rating the competencies of their present teacher. The teachers were informed about the evaluation study and they all agreed with being evaluated. To prevent socially desirable answers and to protect anonymity, teachers left the room until the students had completed the questionnaires. Completed questionnaires were collected by a student and delivered in a sealed envelope in the mailbox of the researcher.

### Statistical analysis

To verify whether the original three-factor structure was supported, we performed a confirmatory factor analysis: the

Oblique Multiple Group Method (OMG) (Stuive et al. 2008). This implied constructing subscales by combining all items that belong to the same scale and calculating the correlation of each item with each subscale corrected for self-correlation. Subsequently, we determined whether each item correlated most strongly with the subscale to which it was supposed to belong. If an item correlates more strongly with other scales, this indicates that it was not assigned to the right scale and should be moved to the scale with which it correlates most.

## Results

The response rate was 63% ( $N=501$ ): 278 medical, 80 dental and 143 speech & language therapy students. The proposed mini-STERLinG structure explained 62.6% of the variance (Table 1). All items correlated strongest with the scale to which they were assigned. The reliabilities of the new mini-STERLinG and its subscales were high with Cronbach's alphas of 0.91 for the entire mini-STERLinG and 0.87, 0.85 and 0.81 for the respective subscales (*supporting self-insight, creating a safe environment and encouraging self-regulation*).

## Discussion

The aim of this study was to develop and validate a short form of the STERLinG. We found strong support for the original three-factor structure and its reliabilities were high. Therefore, it seems a feasible, valid and reliable instrument apt for evaluation and further research. In future, standards for acceptable teacher performance should be developed to enable identification of teachers functioning below standard.

**Table 1.** Results of the confirmatory factor analysis using the Oblique Multiple Group Method.

No	Item	Loadings on subscales		
		1	2	3
<i>Supporting self-insight</i>				
	My coach.....			
1	Helps me recognize personal feelings	<b>0.62</b>	0.40	0.35
2	Helps me to become aware of the emotions that influence my behaviour	<b>0.62</b>	0.32	0.34
3	Helps me to investigate my behaviour from a distance	<b>0.57</b>	0.35	0.37
4	Stimulates me to pay attention to contradictory feelings	<b>0.55</b>	0.31	0.32
5	Helps me to take a closer look at my thinking habits	<b>0.54</b>	0.29	0.37
<i>Creating safe environment</i>				
	My coach.....			
6	Develops trusting relationships with the students	0.37	<b>0.52</b>	0.40
7	Establishes a safe learning environment in the group	0.39	<b>0.52</b>	0.39
8	Shows commitment with the students of the group	0.26	<b>0.53</b>	0.40
9	Affirms my self-worth	0.40	<b>0.53</b>	0.39
10	Is willing to accept feedback from students	0.25	<b>0.51</b>	0.32
<i>Encouraging self-regulation</i>				
	My coach.....			
11	Stimulates me to take responsibility for my own learning process	0.40	0.39	<b>0.51</b>
12	Encourages me to develop my own learning objectives	0.37	0.39	<b>0.50</b>
13	Stimulates me to take responsibility for my professional development	0.36	0.40	<b>0.49</b>
14	Stimulates me to give constructive feedback about our group performance	0.35	0.40	<b>0.44</b>
15	Gives feedback on my attitude	0.26	0.32	<b>0.39</b>
	Variance explained	62.6%		

Additionally, research might investigate whether perceived teacher competencies to facilitate reflective learning are related to students' improvement in reflection skills.

The mini-STERLinG is limited to a selection of the original variables. Although we made a careful and conscious choice, we acknowledge that other researchers might make other selections. The large amount of explained variance, however, indicates that we caught the essence of each of the three domains, that we made a defensible selection and that the mini-STERLinG can validly be used as a signalling instrument. If teachers perform below standard, the original STERLinG can be used to gain more insight in their competencies and tailor teacher training to their needs.

To conclude, we recommend the mini-STERLinG as a feasible, valid and reliable instrument to measure students' perceptions of teachers' competencies to encourage reflective learning in small groups.

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